BIOGRAPHICAL INFORMATION

Raymond L. Pickholtz:

Professor and Past Chairman
Department of Electrical
Engineering and Computer Science
The George Washington University
Telephone:(202) 994-6538
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President: Telecommunication
            Associates

Telephone: (703) 280-5628

<u>Fields of Specialization:</u>

Communication Systems, Data and
Computer Communications
Telecommunication Networks,
Secure Communications
Array Signal Processing

<u>Professional Background:</u>

1964 - 1971	Adjunct Associate Professor Physics, Brooklyn College of CUNY
1972 - Present	Professor of Engineering and Applied Science, The George Washington University
1977	Visiting Professor, Universite du Quebec, Institut National Researches de la Scientifique
1978 - 1980	Chairman, Department of Electrical Engineering and Computer Science, The George Washington University
1983, 1990	Visiting Professor, University of California at San Diego, Department of Electrical Engineering and at Santa Barbara, Department of Computer Science
1965 - Present	President, Telecommunications Associates, Inc.

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1954 - 1960	New York University, Instructor of Engineering Electronics
1954 - 1957	RCA Laboratories (Research on Color Television Circuitry and Systems)
1957 - 1959	ITT Laboratories - Senior Engineer
1959 - 1962	ITT Laboratories -Technical Specialist
1962 - 1965	Polytechnic Institute of Brooklyn, Instructor in Electrical Engineering
1965 - 1967	Assistant Professor of Electrical Engineering, Polytechnic Institute of Brooklyn
1967 - 1971	Associate Professor of Electrical Engineering, Polytechnic Institute of Brooklyn
1968 - 1970	Consultant, IBM T.J. Watson Research Center, Yorktown Heights, New York
Education:	B.E.E., City College of New York, 1954 M.E.E., City College of New York, 1958 Ph.D., Polytechnic Institute of Brooklyn, 1966

Professional Activities:

President, IEEE Communications Society (1990-1991)

Vice President, IEEE Communications Society (1986-1988)

Chairman, Fellow Selection Committee, IEEE Communications Society (1983-1991).

Chairman, National Commission C, URSI (1991-1992)

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Board of Governors, IEEE Communications Society (Elected Position) (1981-84) (1989-1993)

Fellow, IEEE

Fellow, American Association for the Advancement of Science

Fellow, Washington Academy of Sciences

Chairman, U.S. National Commission C, URSI (1990-92)

Elected to Executive Committee IEEE Washington Section, (1973-74)

Elected to Executive Committee IEEE Northern Virginia Section (1983-1985)

General Chairman, Third Data Communication Symposium (IEEE/ACM)

Chairman, Technical Committee on Societal Implications of Technology. (IEEE), 1984

Chairman, Professional Group on Information Theory, Metropolitan Section, (1971-72)

Member, Association for Computing Machinery (ACM)

Conference Board IEEE Communications Society (1980-83)

Member, Mathematical Association of America

Member, Commission C, URSI; U.S. delegate to XXth Congress

Delegate, National Research Council, National Academy of Science for IEEE (1982-84), Re-elected (1985-1987)

Member, Washington Society of Engineers

Member, Philosophical Society of Washington

Member, Steering Committee of MILCOM, INFOCOM (1986-90)

Member, Scientific and Industrial Advisory Board, Premier's Technology Fund, Ottawa, Canada (1991 -)

Scientific Advisory Board, Telecommunications Research Institute of Ontario (TRIO) (1990 -)

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Scientific Advisory Board, Institut National Researches de la
Scientifique, Quebec, Canada, (1992 -   ).

International Advisory Committee, TENCON, Melbourne, Australia,
(1992).

Advisory Committee, International Symposium on Personal
Communications, Nanjing, China, 1993.

Editorships:

Editor, IEEE Transactions on Communications for Computer
Communications (1972-76).

Associate Editor, Journal of Telecommunications Networks,
(1981-1986).

Editor, Series of Communications and Signal Processing, Computer
Science Press, Potomac, MD, (1981-   ).

Guest Editor, IEEE Transactions Special Issue on Computer
Communications, Jan., 1977.

Guest Editor, IEEE Transactions Special Issue on Military
Communications, Sept. 1980.

Guest Editor, IEEE Network, Special Issue on Network Security,
April 1987.

Guest Editor, IEEE Communications Magazine, Special Issue on
Technology, June 1987.

Guest Editor, IEEE Journal of Selected Areas of Communications,
Special Issue on Secure Communications, 1989.

Guest Editor, IEEE Journal on Selected Areas of Communications,
Special Issue on Spread Spectrum Systems, 1990.

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Honors and/or Honorary Fraternities:

IEEE Centennial Medal, 1984.
Fellow, IEEE - "For contributions to the design of Digital
    Communications Systems and to Engineering Education", 1981
Fellow, American Association for the Advancement of Science
    (AAAS), for "outstanding research in telecommunications", 1986
Fellow, Washington Academy of Sciences, 1986
Elected to Cosmos Club, 1986
RCA Labs Research Award, 1954 - "For outstanding contributions to
    the development of color TV receivers"
Fellow, American Association for the Advancement of Science
    (AAAS), 1986 Elected to Fellow, Washington Academy of Science
Cosmos Club, 1986
ETA Kappa Nu
William Hance Memorial Medical in Mathematics
Rensselaer Polytechnic Institute Medal in Mathematics and Science
Pi Mu Epsilon Award for Interstate Mathematics Competition
Physics Teachers Award
Chemistry Teachers Award
Sigma Xi
Recipient of NSF Research Initiation Grant 1968-1969
Listings of Who's Who in America and in American Men and Women of
    Science and Who's Who in Engineering
Recipient of book award from the society of Technical
Communications for "Local Area and Multiple Access Networks", 1986

Research Activities

Principal Investigator, NASA Grant on Space Communications, 1966-
    71.
Principal Investigator, NSF Grant on Modelling Analysis on Data
    Networks, 1971-76.
Co-Principal Organizer, NSF Symposium on Modelling and Analysis
    of Data Networks, 1975-76.
Principal Investigator, U.S. Army Research, Analysis of
    Development of Image Analysis for Computer Topography, 1979.
Principal Investigator, Joint IR & D, Melpar Division of E-
    Systems, Analysis and Design of Local Area Network, Array
    Processing Algorithms (1983-)
Principal Investigator, Joint IR&D, MCI Corp. (1989 - Study of
    Fast Packet Switching.
Principal Investigator, INTELSAT (1989-1990) Study of Secure
    Command Lines for Satellite.

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Currently doing research in packet switching, adaptive routing, and satellite communications, modelling of data networks, and Personal Communications Systems.
Also secure communications and electronic counter-counter measures; spread spectrum systems, adaptive null-steering antenna arrays, Microcellular Personal Communications Networks.

Principal Publications

"Statistical Decision Theory and Digital comm.," ASEE Record, June 1964, pp. 63-74.

"Demodulation of Signals Transmitted Through a Random Channel," PIBMRI Report #1328-66, June 1966 (with M. Schwartz).

"A Recursive Approach to Signal Detection," IEEE Trans. on Information Theory, Vol. IT-14, pp. 445-450, May 1968 (with R. Boorstyn).

"Transient Behavior of a Phase Locked Loop in the Presence of Noise" (with Dominiak) IEEE Transactions on Communications Technology, Vol. Com. 18, No. 4, 1970 pp. 452-456.

"A Second-Order Gradient Algorithm", Proc. of PIB Symposium on Computer Processing in Communications Technology, August 1970.

"An Analysis of the Effectiveness of Hybrid Data Transmission Systems," IBM Journal of Research and Development, Vol. 14, No. 4, July 1970, pp. 433-436.

"Terminal-Oriented Computer Communication Networks," Proc. IEEE, Vol. 60, No. 11, November 1972, pp. 1408-1423 (with M. Schwartz and R. Boorstyn).

"Improvements in Routing in a Packet-Switched Network", Proc. ICCC, June 1974, pp. 249-252.

"Optimal Data Channel Equalization Using Normalized Stochastic Approximation Methods," Proc. ISIT, October 1974.

"Convergence Properties of Normalized Stochastic Approximation Methods," Proc. IEEE on Decision on Control, November 1974.

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9/21/92

"Automatic Equalization Using a Successive Overrelaxation Iterative Technique", IEEE Trans. on Information Theory, January 1975.

"Currents in Computer Communication," in book "Computer Communication, N. Macon, Ed., ICCC, Washington, D.C., 1975.

"Effects of a Priority Discipline or Routing in a Packet Switched Networks," (with McCoy), IEEE Transactions on Communications, Vol. Com-24, March 1976, pp. 506-516.

"Analysis of a Reservation Multiple Access Technique for Data Transmission via Satellites," (with M. Balagangadhar), IEEE Transactions on Communications, Vol. Con-27, No. 10, Oct. 1979, pp. 1467-1475.

"Optimization of the Processing Gain of an FSK-FH System," (with Schilling, Milstein and Brown) IEEE Transactions on Communications, Vol. 28, No. 7, pp. 1962-1969, July 1980.

"Optimization of the Processing Gain of a M-array Direct Sequence Spread Spectrum Communications System," (with D. Schilling) IEEE Transactions on Communications, Vol. 27, No. 8, pp. 1389-1399, August 1980 (lead paper).

"Performance Modelling for Packet Networks with Overflow Channels" (with S. Yuill), IEEE Transactions on Communications, June 1981, pp 808-815.

A Simple Unified Phasor Analysis for PN Multiple Access to Limiting (satellite) Repeaters" (with J. Aein) IEEE Transactions on Communications, Vol. Com-30, No. 5, May 1981, pp. 1018-1026. Also, chapter in book, Spread Spectrum Communications, C.E. Cook et. al. ed., John Wiley, NY 1983, pp. 228-237.

"Theory of Spread Spectrum Communications" (with D.L. Schilling) IEEE Transactions on Communications, Vol. Com-30, No. 5, May 1982, pp. 855-884. Also, chapter in book "Spread Spectrum Communications, C.E. Cook, et. al., ed. John Wiley, NY 1972, pp. 57-86.

"Comparison of Performance of Digital Modulation Techniques in the Presence of Adjacent Channel Interference" (with L. Milstein) IEEE Transactions on Communications, Vol. Com-30, No. 8, August 1982, pp. 1982-1984.

RAYMOND L. PICKHOLTZ
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"Analysis of Integrated Voice/Data Multiplexing" (with A. Konheim) *IEEE Transactions on Communications*, Vol. 32, No. 2, February 1984, pp. 140-147.

"Control Loop Noise and SINR of an Adaptive Null-Steering Antenna" (with El Din and Lang) submitted to *IEEE Transactions on Antennas and Propagation*, October 1984, accepted for publication.

"Modems, Multiplexers and Concentrators" chapter 3 in *Data Communications Networks and Systems*, T.C. Bartee, ed. Howard W. Sams and Co., Indianapolis, 1985, pp. 63-117.

"Stochastic Effects in Adaptive Null-Steering Antenna Array Performance", *IEEE Journal on Selected Areas in Communications*, vol. SAC-3, Sept. 1985, pp. 767-778.

"Cryptography in the Private Sector" (with D. Newman), *IEEE Communications*, pp. 7-10, August 1986.

"Effect of HF Differential Propagation Delay on FH Communications" (with Milstein et. al) *IEEE Transactions on Communications*, 1986, pp .

"Cryptography in the Private Sector", (with Newman) *IEEE Co. Maga.* Vol. 24, No. 8, August 1986, pp. 7-10.

"Performance of Meteor-Burst Communication Channels" (with Milstein) *JSAC* vol. SAC 5, No. 2, Feb. 1987, pp. 146-154.

"Public Key Management" (with Omura, Newman) *Network Mag.* vol. 1, No. 2, April 1987, pp. 11-17.

"Performance of Direct Sequence Spread Spectrum in a Fading Dispersive Channel with Jamming" (with Vojcic) *IEEE Journal on Selected Areas in Communications*, vol. 7, No. 4, May 1989, pp. 561-568.

"Probabilistic Image Models and Their Information-Theoretic Properties" (with Zhang, Loew) *SPIE Vol. 1092 Medical Imaging III Image Processing*, 1989, pp. 75-81 (also submitted to *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 1989).

"Combined-Coding Techniques for Radiographic Image Data Compression" (with Zhang, Loew *SPIE vol. 1199 Visual Communications and Image Processing*, 1989 pp. 89-93.

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"Performance of Coded Direct Sequence Spread Spectrum in a Fading Dispersive Channel with Pulsed Jamming" (with Vojcic) Journal of Selected Areas in Communications, vol. 8, No. 5, June 1990, pp 934-942.

"Spread Spectrum Goes Commercial" (with Schilling, Milstein), IEEE Spectrum, August 1990, pp. 40-45 (reprinted and expanded in Datapro MT20-690-1019 McGraw Hill, 1991).

"Variable-Bit-Rate Video Transmission in the Broadband ISDN Environment," (with Y. Zhang, et. al)., Proc. of IEEE, vol. 79, No. 2, Feb. 1991, pp. 214-222.

"A Combined-Transform Coding Scheme for Image Data Compression," (with Y. Zhang and M. Loew), IEEE Trans. Consumer Electronics, Vol. 79, No. 2, Feb. 1991, pp. 45-50.

"A Methodology for Modeling the Distribution of Medical Images and Their Stochastic Properties," IEEE Trans. on Medical Imaging, Vol. 9, No. 4, Dec. 1990 (with Y. Zhang, and M. Loew), pp. 376-383.

"Probabilistic Image Models and Their Information-Theoretic Properties," Accepted by IEEE Trans. on Acoustic, Speech and Signal Processing (with Y. Zhang, M. Loew).

"Rate-Distortion Performance of a Class of Image Sources," submitted to IEEE Trans. Information Theory (with Y. Zhang, M. Loew).

"A New Approach to Reducing the Blocking Effect of Transform Coding," accepted for publication, 1991 IEEE Transactions Communications, (with Y. Zhang, M. Loew).

"Correlation Models for a Class of X-ray Images," submitted to IEEE Trans. Biomedical Imaging (with Y. Zhang, M. Loew).

"Performance Degradation in Heterogeneous Computer Network Interconnection," submitted to IEEE Transactions on Communications (with B. Jabbari, Y. Zhang).

"Spread Spectrum for Commercial Applications" (with Schilling) IEEE Communications vol. 29, No. 4 April 1991, pp. 66-77.

"On the Feasibility of a CDMA Overlay for Personal Communications Networks" (with Milstein et al) submitted to IEEE JSAC, 1991.

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"Efficient Signals Analysis Using Interactively Convergent (ICON) Eigenstructure Techniques" (with S. Heppe) submitted to IEEE Trans. on Signal Processing, 1991.

"Spread Spectrum for Personal Communications, Microwave Journal, vol. 34, No. 9, September 1991, pp 26-40 (revised and adopted from Apr. 1991 paper in Communications) "Broadband CDMA for Personal Communications, IEEE Communications, November 1991, pp 86-93.

"A Combined-Transform Coding (CTC) scheme for Medical Images" (with Zhang, Loew), IEEE Transactions on Medical Imaging, vol. 11, No. 2, June 1992 pp 196-202.

"On the Feasibility of a CDMA Overlay for Personal Communications Networks" (with Schilling et al), IEEE Journal on Selected Areas in Communications, vol. 10, No. 4, May 1992, pp 655-668.

"Security Analysis of the INTELSAT VI and VII Command Network" (with Newman), IEEE Journal on Selected Areas in Communications. Accepted for publication, 1992.

"Modeling and Queueing Analysis of Variable-Bit-Rate Coded Video Sources in ATM Neworks" (with Marafih) submitted to IEEE Transactions on Circuits and Systems, 1992.

Conference Papers and Others

"Continuous Estimation of Modulated Signals Through Slowly-Varying Dispersive Channels" (SUMMARY) IEEE Annual Communications Convention Conference Record, June 7-9, 1965, pp. 547-548.

"Analog Communications Through Dispersive Channels," 1st International Conf. Info. Theory Record, June 1968, pp. 262-265.

"Adaptive Equalization with a Second-Order Gradient Algorithm," presented at the 1970 International Symposium on Information Theory, Netherlands, June 1970 (with C. Devieux).

"Finite-State Equalization of a Dispensive Data Channel in the Presence of Noise," Proc. of the ICCC, (with K. Dominiak).

"Spectral Analysis of Short Series," International Symposium on Information Theory, Asilomar California, February 1972, (with D. Thompson).

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"A Stochastic Approximation Method for Finite State Equalization," International Symposium on Information Theory, Asilomar, California, February 1972, (with K. Dominak).

"A Relaxation Algorithm for Automatic Equalization," International Symposium on Information Theory, Ashkelton Israel, June 1973.

"Improvements in Routing in a Packet-Switched Network" Proc. ICCC, Stockholm, June 1974, p. 249-252.

"Delay Analysis in a Multiple Class Packet System Using Segmented Message Switching," (with S. Murty), Proc. 3rd International Conf. on Computer Communications, Toronto, Canada, 1975, pp. 536-541.

"Terminal Oriented Computer Communications Networks" invited talk, Symposium on Data Communications, Institute for Advanced Study, Mexico City, June 1976.

"Dynamic Satellite Slot Allocations for Data Packets Via Adaptive TDM," Proc. NTC, January 1977 (with W. Vogelsang).

"Bounds on the Performance of Queueing System," Proc. Int. Symp. on Information Theory, Oct. 1977.

"Review of Telecommunications and the Computer" by James Martin, IEEE Trans. on Communications, Feb. 1978. Also Proc. IEEE, June 1979.

"Local Control for Packet Switching for an N Station Polling System," (with C. Omidyar), Proc. Pacific Telecommunications Conference, Jan. 1979.

"A Reservation Multiple Access Technique for Data Transmission Via Satellites," (with M. Balagangadhar), Proc. National Telecommunications Conference, Nov. 1979.

"Low Rate Coding for Spread Spectrum," (with H. Helgert), Proc. National Telecommunications Conference, November 1979.

"Optimization of the Processing Gain of an FSK-FH System," (with L. Milstein and D. L. Schilling), Proc. National Telecommunications Conference, 1980.

"Performance Modelling for Packet Networks with Satellite Overflow Channels," (with S. Yuill), National Telecommunications Conference, 1980.

RAYMOND L. PICKHOLTZ
9/21/92

"Transient Analysis of an Adaptive Null Steering Antenna Array," (with R. Lang), National Telecommunications Conference Proceedings, Dec. 1980.

"Special Issues on Military Communications", co-guest editor IEEE Transactions on Communications, Vol. 27, No. 8, September 1980.

"The Effects of Frequency elective Fading on 16-ary QASK",: (with L.B. Milstein and D.L. Schilling), Conference on Information Science and Systems, 1981.

"Design Concepts for Packet Networks with Auxiliary Satellite Channels," (with S. Yuill), International Conference on Communications Record, June 1981, pp. 41.3.1-51.3.5.

"Image Processing for Cartographic Applications" (with M.H. Loew and L. Goldman) Proc. 7th International Symposium on Machine Processing of Remotely Sensed Data, pp. 447-453, Purdue University, June 1981.

"Effect of Adjacent Channel Interference on Performance of QPSK, 8-PSK, 16 QASK and QPR" ICC Conference Record, Vol. 3, June 1982, pp. 6F.4.1-6F.4.3.

"The Effect of Frequency Selective Fading on MSK and QPR" Abstracts of the International Symposium on Information Theory, June 1982, p. 170.

"Feature Selection in Cartographic Image Processing," (with Loew) Proc. 6th Int. Conf. on Pattern Recognition, Munich, October 1982.

"Delay Behavior of Reserved Priority Channels Operating on a CSMA/CD Protocol", Proc. Globecom (with Abdelaziz) Dec. 1984, pp. 1099-1104.

"A New Priority User Protocol for CSMA/CD and Its Analysis" (with Abdelaziz) Globecom Record, November 1984, pp. 654-658.

"The Effects of Weight Fluctuations on the Performance of Null-Steering Adaptive Arrays" (with Lang and El-din) Milcom Record, October 1984, pp.

"An Approximate Analysis of Integrated Voice/Data Multiplexing with Voice Blocking and Limited Waiting Room (Buffer) for Data" (with Moussavi) Globecom Record, Nov. 1984.

RAYMOND L. PICKHOLTZ
9/21/92

"Delay Behavior of Reserved Priority Channels Operating on a CSMA/CD Protocol" (with Abdelaziz) Proc. of International Conf. on Comm. ICC. Chicago, IL, June 1985, pp. 1099-1104.

"Application of a Bulk Queueing Model for the Delay Behavior of a CSMA/CD Protocol with Priority Channels. International Symposium on Information Theory, Brighton, England, June 1985, pp.

"Performance Analysis of a Priority User Protocol Embedded in a CSMA/CD Channel", INFOCOM Record, Washington, D.C., March 1985, pp. 419-425.

"New Analysis of the Adaptive Array Performance in the Presence of Multiple Interfering Sources", MILCOM record, October 1985, pp. 524-529.

"Analysis of Two Protocols for Meteor-Burst Communications": ICC Proceedings, 1986, pp. 632-635.

"Comparison of the Performance of a K=4, R=3/4, 16 QAM Trellis Code" (with Hill) MILCOM '87 CONF REC, October, 1987, pp. 497-501.

"Performance Analysis of Moving Boundary/Fixed Frame Integrated Voice/Data Multiplexing Techniques with Correlated Sources" (with McDysan) INFOCOM PROC '88 March 1988 pp. 661-677.

"Packetized Multimedia Communications" International Workshop, Osaka, November, 1987.

"Projection Codes - A New Class of FEC, Burst Correction and ARQ Codes" (with Schilling and Manela) Proc. MILCOM, October 1987, pp. 521-527.

"Computer Networking in the Peoples Republic of China", IEEE Communications, November 1988, pp 61-68.

"Performance of Direct Sequence Spread Spectrum in a Fading Dispersive Channel with Jamming" (with Vojcic) First International Symposium on Spread Spectrum Techniques Belgrade, June 1988.

"Performance Analysis of Integrated Voice/Data Multiplexing Systems with Local and Remote Data Sources" (with McDysan) Proc. GLOBECOM, November 1988, pp .

RAYMOND L. PICKHOLTZ
9/21/92

"A Token Passing Data Associated Protocol For Local Computer Networks (with Klopper and Jabbari) INFOCOM Proceedings, May 1989 pp. 608-613.

"Layered Video Coding in Broadband ISDN," Presented at IEEE MULTIMEDIA'90, Nov. 15-17, 1990, France.

"A Combined-Transform Coding Scheme for Image Data Compression," Proceedings of IEEE GLOBECOM'90, Dec. 1-4, 1990, San Diego, CA, pp. 972-997.

"A Single Priority Scheme for Local Area Networks and Its Analysis" (with Haggag INFOCOM Record pp. 230-237, May 1990.

Probabilistic Image Models and Their Information Theoretic Properties (with Zhang, Loew) SPIE vol. 1092 Medical Imaging III Image Processing, 1989, pp. 75-81 (also submitted to IEEE Transactions on Pattern Analysis and Machine Intelligence), Jan. 1989.

"Combined-Coding Techniques for Radiographic Image Data Compression" (with Zhang, Loew SPIE vol 1199 Visual Communications and Image Processing, 1989 pp. 89-93.

A Token Passing Data Associated Protocol For Local Computer Networks (with Kopper and Jabbari) INFOCOM Proceedings, May 1989, pp. 608-613.

"The Performance of A CPFSK Trellis Code in a Non-Gaussian Noise" (with Hill) MILCOM Record, October, 1989, pp. 769-772.

"Estimating the Number of Signals Using the Eigenvalues of the Correlation Matrix" MILCOM Record, October 1989, pp. 353-358.

"A Generalized Gaussian Autoregressive Model for Chest X-ray Images" (with Zhang, Loew) Proceedings IEEE Internatinal Conference in Medicine and Biology, Nov. 1989.

"On the construction of Joint Probabilistic ImageModels (with Zhang, Loew), Proceedings IEEE International Conference in Medicine and Biology, Nov. 1989.

"On Modelling the Distribution of Chest X-ray Images" with (Zhang and Loew), Sixth Multidimensional Signal Processing Workshop, September 1989. IEEE Pattern Recognition Conf. Proc. pp. 218-223, June 1990.

RAYMOND L. PICKHOLTZ
9/21/92

"Performance Analysis of an ATM SwitchUnder Nonuniform Traffic Conditions" (with Marafih) Proc. 6th MCI Technology Symposium, pp. 105-119, October 1989.

"Correlation Models for a Class of X-ray Images," (with Zhang) Proceedings of Int. Conf. IEEE Eng. Med. Bio. Soc. '90, Philadelphia, Nov. 1-4, 1990.

"On the distribution of a class of X-rays and Their Stochastic Properties," (with Zhang) Proceedings of 10th Int. Conf. Pattern Recognition, pp. 218-223, June 18-22, 1990, Atlantic City, NJ

"Digital Medical Imaging Networking," (with Zhang) to present at SPIE Medical Imaging V, Vol. 1446, San Jose, Feb. 1991.

"Combined-Transform Coding for Medical Image Data Compression," (with Zhang) to present at SPIE Medical Imaging V, Vol. 1446, San Jose, Feb. 1991.

"Correlation Model for a Class of Chest X-ray Images," (with Zhang) to present at SPIE Medical Imaging V, Vol. 1446, San Jose, Feb. 1991.

"Rate-Distortion Performance of a Class of Image Sources," (with Zhang) Proceedings of 1990 Int. Symp. Information Theory and Its Applications, Hawaii, Nov. 27-30, 1990.

"Overlay Considerations in Cellular Spread Spectrum, Radio Networks" IEEE Int'l Symp on Information Theory and Its Applications, November 27-30, 1990 Honolulu, pp. 849-851.

"A Comparison of TDMA and CDMA in Microcellular Radio Channels (with B. Vojcic) Proceedings of the ICC, vol. 2 pp. 866-879, June 1991.

"A Spectrally Efficient CDMA Overlay" (with Schilling et. al.) Proc. Milcom, November 1991 pp 1183-1186.

"Modelling and Queueing Analysis of VBR - Coder Full Motion Color Video Sources in ATM Network" INFOCOM, Milan, Italy 1992.

"CDMA for Personal Communications Networks" (with Schilling and Milstein) Proc. First Symposium on Wireless Personal Communications, June 1991.

RAYMOND L. PICKHOLTZ
9/21/92

"Shared Spectrum Considerations in the Design of a Direct Sequence PCN (with Mulstein et al) Proc. First Symposium on Wireless Personal Communications, June 1991, pp. 12.1-12.12.

"Field Tests Design to Demonstrate Increased Spectral Efficiency for Personal Communications" (with Milstein et al) Proc. Globecom, December 1991, pp 878-882.

"Future Personal Communications and Shared Spectrum Management" (with Schilling et al), Proc., Commsphere Symposium, December 1991, pp. 2.41-2.45.

"Cell Design for a Broadband CDMA Personal Communications Network, International Conference on Communications Conference record" (ICC '92) Chicago, Il, June 1992, pp 865-869.

"Improved PCN Efficiency Through the Use of Spectral Overlay" (with Schilling), ICC Conference Record", June, 1992, pp 243-244.

"Issues in Microcellular Communicators - A TDMA Performance Example (with Vojcic) Symposium Proceedings", George Mason University, June 1992.

"Modelling and Queueing Analysis of Variable-Bit-Rate Coded Video Sources in ATM Networks" (with Marafih), Globecom '92.

"TDMA Performance for Personal Communications Networks" (with Vojcic), Globecom '92.

Book Contributions

"Terminal-Oriented Computer Communication Networks" pp. 185-200 in Advances in Computer Communications (selected reprints, W.W. Chu, ed., Artech House, Inc., U.S.A. 1976).

"Modems, Multiplexers, and Concentrators" Chapter 4 in Data Communications, Networks, and Systems, T. Bartee, ed. ITT-Sams Publishing Co., Indianapolis, 1985, Second Edition, 1991.

"Theory of Spread Spectrum Communications," pp. 57-86 and "A Simple Unified Phasor Analysis for PN Multiple Access to Limiting Repeaters," pp. 228-236, both in Spread Spectrum Communications, (reprint selections), C.E. Cook et al., eds., IEE Press/John Wiley, New York, 1983. Also, reprinted in IEEE Multiple Access Communications, N. Abramson, ed., IEEE Press, 1992.

RAYMOND L. PICKHOLTZ
9/21/92

Book

Local Area and Multiple Access Networks (ed), Computer Science Press, Rockville, MD 1986.

Patents Granted:

2,946,845 - Gain Control of Demodulators
3,180,205 - Distance-measuring Apparatus
3,180,927 - Cryptosecure Transmission System
3,453,870 - Self-contained Mass Measurement
3,675,131 - Coherent Phase Locking in Data Modems

Consulting and Contract Work:

IBM Research (1968-71)
Fairchild Industries (1971)
U.S. Department of Commerce (1978)
Computer Sciences Corporation (1964-68)
Instruments for Industries (1961-63)
General Atronic Corporation (1965)
Communications Systems Inc.
Federal Communications Commission (1972-73)
Xonics Corporation (1974)
Institute for Defense Analysis (1974-present)
ITT (1976, 1979)
State of Minnesota (1977)
Federal Aviation Agency (1978)
U.S. Army, Department of Defense (1978-82)
National Telecommunications and Information Agency (1980-82)
AFC Corporation (1981-83)
Warner Amex Communications (1982-84)
Magnavox Corporation (1982-84)
Anro Engineering (1983-84)
Vega Precision (1984-88)
Broadcom (1985-87)
Davis Hoxie Faithful and Hapgood (1988)
ECCO (1989)
Pactel Cellular Communications (1989)
Wolf Greenfield and Sacks (1989)
R. J. Banks, Inc. (1989)
PCN America (1990 - 1991)
TV Answer (1992 -)
Bell Atlantic Personal Communications, Inc. (1992 -)

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Banner, Birch, McKie and Beckett (1992 -   )
Motorola (1992 -   )
Latham and Watkins (1992 -   )

Professional Courses Taught:

Western Electric Corporation
Bell Telephone Laboratories
IBM Research
Bell Northern Research
Bell Canada
Manitoba Telephone System
British Columbia Telephone Company
Tektronics Corporation
National Security Agency
International Telephone and Telegraph Company
Ford Aerospace Corporation
MITRE Corporation
Planning Research Corporation
Defense Communications Agency
U.S. Navy
U.S. Air Force
U.S. Army
U.S. Marine Corps
Transcanada Telephone System (TCTS)
Telecom Canada
International Telecommunications Union (ITU)

Invited Lectures

"Digital Satellite Communications," Manitoba Section of IEEE, Jan. 1977.

"Time Division Multiple Access," British Columbia Communications Society, Feb. 1977.

"Orthogonal Signals, Hadamard Transforms, and Green Machines," McGill University and Univesite' du Quebec, April 1977.

"A New Adaptive Routing Algorithm for Packet Switched Data Networks," University of Maryland, 1977.

RAYMOND L. PICKHOLTZ
9/21/92

"Current Developments in Computer - Controlled Electronic Switching," IEEE Washington Section Communications Society, Feb. 1978.

"Time-Division Digital Switching," Computer Science Colloquium, University of North Carolina, April 1978.

"Spread Spectrum Communications - Fresh Insights", Computer Science/Electrical Engineering Colloquium, North Carolina State University, October, 1979.

"Data Communications," University of Ottawa Symposium, 1980.

"Modern Digital Communications," George Mason University, 1980.

"Transient Behavior of Adaptive Null Steering Antenna Arrays," Institute for Defense Analyses, 1980.

"Analysis of Pseudo-Noise Spread Spectrum Communications Via A Hard Limiter," Electrical Engineering Dept. Colloquium, University of Virginia, 1981 and at INTELSAT Corp. Seminar, 1981.

"Current Topics in Communications Theory," Cairo, Egypt, 1981.

"Design and Analysis of Data Communications Systems," Electrical Engineering and Computer Science Department Joint Seminar, North Carolina State University, 1981.

"New Developments in Data Communications," University of Mexico, Mexico City, 1982.

"Cryptographic Methods of Data Protection," Washington Philosophical Society, Washington, D.C. , 1982.

"Issues in Underwater Acoustic Communications," Acoustic Speech and Signal Processing Workshop, Washington, D.C., 1982.

"Coding for Multi-User Communications," Department of Electrical Engineering, San Diego State University, 1983.

"Spread Spectrum and Multiple-Access Communications," 4 lectures in the Distinguished Lecturer Series, Department of Computer Science and of Electrical and Computer Engineering, University of California, 1983.

"Spread Spectrum Communications," IEEE Boston Section, 1983.

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"Adaptive Arrays", George Mason University and IEEE.

"Local Area Networks with Priority Channels", Computer Sciences Corporation, Falls Church, VA, Feb., 1985.

"Local Area Networks", NASA, Goddard SPC, Greenbelt, MD, Feb., 1985.

"Coding for Multi-User Communications and Applications to Local Area Networks", University of Waterloo, Feb., 1985.

"LAN with Priorities", Rutgers University, March, 1985.

"Adaptive Antenna Arrays", Rutgers University, April 1985.

"Throughput and Delay Analysis for Local Analysis for Local Area Networks", NC State U, November, 1985.

"Adaptive Antenna Arrays for Satellite Communications," INTELSAT Distinguished Seminar Series, December, 1985.

"Spread Spectrum Technology", IEEE Boston Section, March, 1986.

"Adaptive Communications", Dept. of EE University of Maryland, Feb., 1986.

"Novel Techniques of Adaptive Communications", GTE Laboratories, March, 1986.

"An Application of Bulk Queueing Theory to a Problem in Local Area Networks", Dept. of Operations Research and Statistics, George Mason University, September 1986.

"Data Integrity in Computer Communication Networks" Polytechnic University Centennial Celebration Lectures, September, 1986.

"Perturbation Methods for Stochastic Differential Systems" Dept. of EE, University of Virginia, October, 1986.

"Priority Reservation Protocols for LANS", Technology Strategies Conference ADPA, February 1987.

"Digital Authentication and Security", Edwin Armstrong Memorial Lecture, State University of New York at Stony Brook, February 1987.

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"Protocols for Network Security", IEEE National Capital Area Symposium, February, 1987.

"Adaptive Arrays: Algorithms and Analysis" IEEE Baltimore Section and Johns Hopkins APL, March 1987.

Invited Seminar Speaker "Secure Data Networks" Department of ECE and CS, Sponsored by U. North Carolina, N.C. State U. and Duke U., September 1987.

Invited Seminar Speaker "Public Key Management Systems" Department of ECE and Systems, University of Virginia, October 1987.

ACM/IEEE invited lecture "Protocols for Authentication in Data Networks" Vienna, VA, December 1987.

Invited Delegate Leader and Lecturer to Peoples Republic of China, July 1987: Presentations on Data Networks, Local Area Networks, Protocol Design.

Beijing
- a) China Institute of Communications
- b) Research Institute of Data Communications Technology
- c) Beijing Institute of Porst and Telecommunications
- d) Academia Sinica
- e) Beijing University

Shanghai
- f) Institute of Computer Technology
- g) Fudan University
- h) Jiao Tong University

Shenyang
- i) Northeast University
- j) Information Processing Society

Nanjing
- k) Nanjing Institute of Technology

"Data Protection and Authentication in Networks" Bellcore, Morristown, NJ, May, 1988.

"The Behavior of Direct Sequence Spread Spectrum Multiple Access in the presence of a Nonlinear Repeater", University of Belgrade, May, 1988.

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"Data Communication For A Paperless Society", New Jersey Institute of Technology, January 1989.

"Data Protection and Security in Networks" ICCC, Tel Aviv, ISRAEL, October 1988.

"Lower Bounds on Angle of Arrival Estimation with Arrays" Melpar Research Seminar, September 15, 1989.

"Fast Packet Switching" Panelist and Moderator at Multimedia Symposium at Montebello, P.Q. Canada, 1989.

"ATM Switch Technology" MCI Technology Symposium, October 1989.

"Lower Bounds on Angle of Arrival Estimation with Arrays", Melpar Research Seminar, Falls Church, VA , September 1989.

"Code Division Multiple Access", Society of Old Crows, Santa Barbara, California, July 1990.

"TDMA v.s. CDMA for Personal Communication Networks" Contel Technology Seminar, Reston, VA, October 1990, Hughes Network Systems, Germantown,MD , November 1990, COMSAT Laboratories, Clarksburg, MD, November 1990.

"WIDE: A Broadband Direction Estimator", The Moore School of Electrical Engineering, University of Pennsylvania, Phila, PA, Jan. 1991.

"Mobile Communications" California Institute of Technology, Pasadena, CA, Feb. 1991.

"Issues and Techniques of Microcellular Personal Communications Networks" International Symposium, Mexico City, Mexico, October 1991.

"New Methods for Digital Signature Authentication" MRJ, Inc. Reston, VA, October 1991.

"Spatial Selectivity Using Arrays for Low Probability of Interference in Mobile Communications", E-Systems, Falls Church, VA, November 1991.

"Communications, Trends and Directions" (keynote) COMMSPHERE '91, International Conference, Herzlia, Israel, December 1991

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"Personal Communications", panelist INFOCOM '92, Florence, Italy, April 1992.

"Wireless Networks" (keynote speaker) 15th Biennial Symposium on Communications, Queens University, Kingston, Ontario, CANADA, May 1992.

"TDMA In a Dispersive Channel" Department of EE and CS, Concordia University, Montreal, Quebec, CANADA, May 1992.

"Personal Communications", panelist, National Telesystems Conference, The George Washington University, Virginia Campus, May 1992.

"Microcellular Networks", MITRE Corp. Reston, VA, August 1992.

"Personal Communication Systems", LCC Cellular Institute, Arlington, VA, September 1992.

"CDMA for Cellular Networks", Clemson University, Clemson, S.C., October 1992.

"Mobile Communications", Panel Chair, MILCOM '92, San Diego, CA, 1992, October 1992.

"New Results in the Comparison of TDMA and CDMA for Microcellular Systems", George Mason University, November 1992.

Course and Curriculum Development:

Elected representative of IEEE to the Accrediting Board of
    Engineering and Technology (ABET) 1985
Polytechnic Institute of Brooklyn (now Polytechnic University)
    Detection and Estimation Theory I, II
    Selected Topics in Communications
    Communications Laboratory I
    Communications Laboratory II
    Linear Systems, I, II, III
    Digital Signal Processing
    Stochastic Processes I, II
    Electronic Laboratories

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The George Washington University

    EE 204 - Stochastic Signals and Noise
    EE 205 - Stochastic Processes in Electrical Engineering
    EE 208 - Digital Image Processing
    EE 241 - Information Theory
    EE 242 - Coding Theory
    EE 243 - Communication Theory I
    EE 244 - Communication Theory II
    EE 245 - Signal Detection and Estimation Theory
    EE 246 - Digital Communication
    EE 248 - Computer Communication Networks I
    EE 249 - Computer Communication Networks II
    EE 250 - Data Communication Security
    EE 252 - Digital Signal Processing Techniques
    EE 257 - Secure Communications: Spread Spectrum and
              Cryptography
    EE 258 - Radio Communications Systems I
    EE 259 - Radio Communications Systems II
    EE 277 - Satellite Communications Systems
    EE 245 - Advanced Detection Theory
    EE 346 - Communications Switching and Traffic Theory
    EE 450 - Telecommunication Systems Concepts
    EE 451 - Survey of Telecommunications Systems
    CS 244 - Data Communications
    CS 213 - Discrete Structures in Computing

Directed:

    Masters Thesis Supervised
        35 Theses (approximate)

    Ph.D. Dissertations Supervised
        26 Dissertations

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